Improving Emergency Medical Service in Acute Stroke Care in Taiwan

Jiann-Shing Jeng

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Thrombolysis with intravenous tissue plasminogen activator (IV tPA) within 3 or 4.5 hours of symptom onset is the only currently proved treatment for acute ischemic stroke and has been shown to be highly cost-effective, and improve long-term functional dependence. However, only 2%-5% of acute ischemic patients can receive the treatment. Delayed presentation to hospitals is the main factor limiting the use of thrombolytic therapy for acute ischemic stroke patients [1]. From the Get With The Guidelines-Stroke program results between 2003 and 2009, only 20.6% of acute ischemic stroke patients can arrived at the emergency department (ED) within 2 hours of stroke onset, and 25.1% within 3 hours in the United States [2]. In Taiwan, 27% of ischemic stroke patients arrived at the ED less than 3 hours after stroke onset [3], and only 1.5% of patients with ischemic stroke were treated with IV tPA between 2006 and 2008 [4]. A pooled analysis of previous thrombolytic trials of acute stroke showed that the benefit of IV tPA decreased as time from stroke onset to start of treatment increased [5]. The sooner the thrombolytic therapy is given to acute ischemic stroke patients, the better the functional outcome and the less occurrence of symptomatic intracerebral hemorrhage. Thus, early presentation of acute stroke patients to hospital and pre-hospital notification are crucial and needed to be improved.

Evidences have shown that a good cooperation between emergency medical service (EMS) and hospitals can significantly enhance early hospital arrival and shorten the onset to needle time in acute ischemic stroke patients [6-8]. Guidelines from the American Heart Association/American Stroke Association highly recommended that the EMS have to do the follows after activation by patients with stroke symptoms: (1) rapid identification of stroke as the cause of the patient's findings, (2) elimination of comorbid conditions that could mimic stroke, (3) stabilization, (4) rapid transportation of the patient to the closest appropriate ED, and (5) notification of the receiving institution about impending arrival of a patient with suspected stroke [9]. To achieve these goals and increase the number of patients who are treated, educational programs for physicians, hospital personnel, and EMS personnel are recommended (Class I, Level of Evidence B) [9].

In this issue of Acta Neurologica Taiwanica, Hsieh and colleagues report the results of developing an educational program for the emergency medical technicians (EMTs) to improve their stroke knowledge and triage accuracy of identifying acute stroke within 3 hours of symptom onset in a community [10]. In this pilot study, a total of 33 EMTs from 6 of 60 EMS teams in Tainan City, participated in this educational program training. This educational program was one-hour course and a written test containing stroke knowledge and clinical

From the Stroke Center and Department of Neurology, National Taiwan University Hospital, Taipei, Taiwan.
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Correspondence to: Jiann-Shing Jeng, MD. Department of Neurology, National Taiwan University Hospital, No.7, Chung-Shan South Road., Taipei 100, Taiwan.
E-mail: jsjeng@ntu.edu.tw

scenarios before and after the educational program was performed. As expected, the EMTs' stroke knowledge and triage accuracy improved by the educational program, and can persist for 3 months after completing the program. The authors are to be commended for carrying out such time-consuming educational program for EMTs and attempting to set up emergency stroke service network in Tainan City.

There are some limitations of this study. This is a small sample-sized survey with a potential for selection bias. It is likely that the EMTs who participated in this program were active and knowledgeable in acute stroke management than those without. Application and dissemination of the educational program and survey to other EMS teams in Taiwan is anticipated. In addition, as authors have stated, the survey questions had better to be validated. It is more expected that the increase in pre-hospital notification and the decrease in onset to door time can be greatly improved after the demanding program.

EMS utilization can significantly reduce pre-hospital delay of acute stroke patients and increase patients assessable to thrombolytic therapy. This assumption is based on a well education and training of acute stroke pre-hospital management in EMTs, and good cooperation between EMS and hospitals. Stroke knowledge is the fundamental part of this training, particularly useful for rapid identification of acute stroke. In addition, stabilization, and rapid transportation of the patients, and pre-notification of the appropriate receiving hospital ED are also crucial for achieving better acute stroke management. We need to check, standardize, and stream these processes. Besides, improving in-hospital delay is also important for shortening door-to-needle time. Target: Stroke, a multidimensional initiative was proclaimed by the American Stroke Association to shorten door-to-needle time <60 minutes for improving the timeliness of IV tPA administration in acute ischemic stroke [11]. Ten key best practices strategies were selected, including EMS prenotification, stroke team activation, rapid acquisition and interpretation of brain imaging, use of specific protocols and tools, a team-based approach, and rapid data feedback. To achieve this complex clinical process successfully may require a highly coordinated, multidimensional, focused effort [12]. Since 2010, a number of hospitals have sought to achieve quality improvement of acute ischemic stroke patients via a collaborative learning model, the Breakthrough Series (BTS)-Stroke, in a nationwide, multi-center activity in Taiwan [13]. Through the collaborative learning and campaign, the frequency of IV tPA of all acute ischemic stroke patients improved significantly from 1.5% (2006-2008 Taiwan Stroke Registry) to 4.1%, and more than 50% of the thrombolytic patients can reach door-to-needle time <60 minutes.

In conclusion, the present study showed that stroke knowledge and triage accuracy can be enhanced by education program for EMTs. Such educational program could be promoted elsewhere EMTs in Taiwan. Furthermore, multidisciplinary specialists, including neurologists, neurosurgeons, and emergency medicine specialists, should cooperate to design a well-coverage emergency stroke service network for acute stroke care in Taiwan.

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